

VORTEX2 Forecasts and Assimilation Studies Center for Analysis and Prediction of Storms

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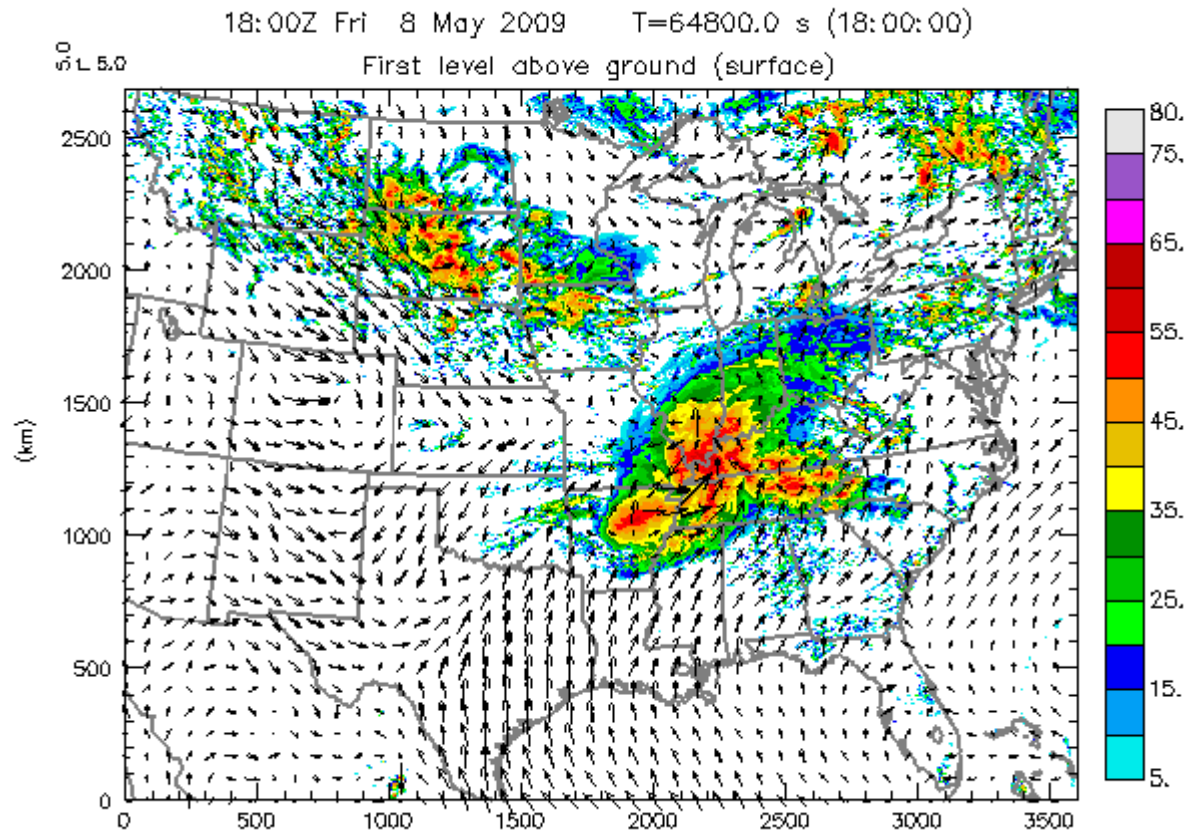
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Vortex-2 PI Meeting
12 November 2009



ARPS Simulated Tornado

Spring 2009 Real-time Forecasts



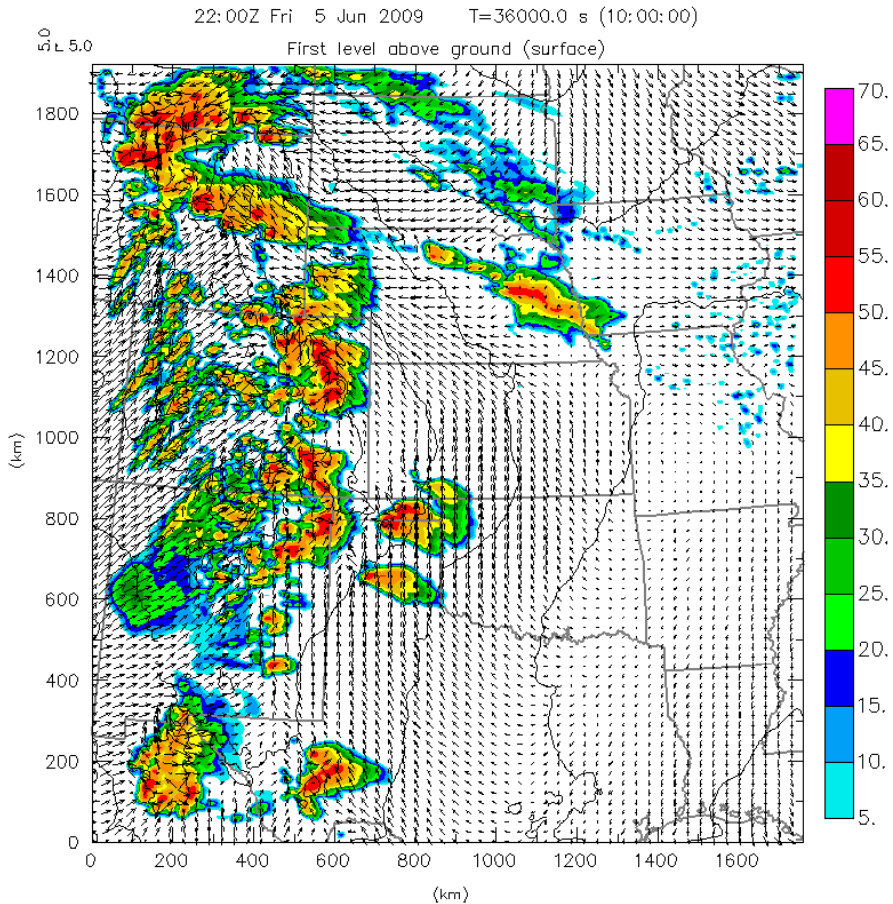
Spring 2009 Real-time Forecasts

- 00 UTC 20-Member 30h Forecast Ensemble
 - ~70% CONUS
 - 10 WRF ARW, 8 WRF NMM, 2 ARPS 4-km
- 00 UTC WRF ARW 1-km with Radar
- 12 UTC 4-km WRF 18h VORTEX2 Domain
 - 1760 km x1920 km
 - With/Without Radar Data
- CASA Forecasts When Storms in Network



VORTEX2 Domain

SPV4C0 (440x480x50, dx=4 km)
10:00 h WRF/ARW Forecast valid 2200Z Fri 05 Jun 2009



Composite Ref (dBZ, Shaded) Min=0.00 Max=59.0
U-V (m/s, Vector) Umin=-17.03 Umax=19.29 Vmin=-20.68 Vmax=19.02
Sea Level Pressure (mb, contour) Min=993.3 Max=1017. inc=4.000

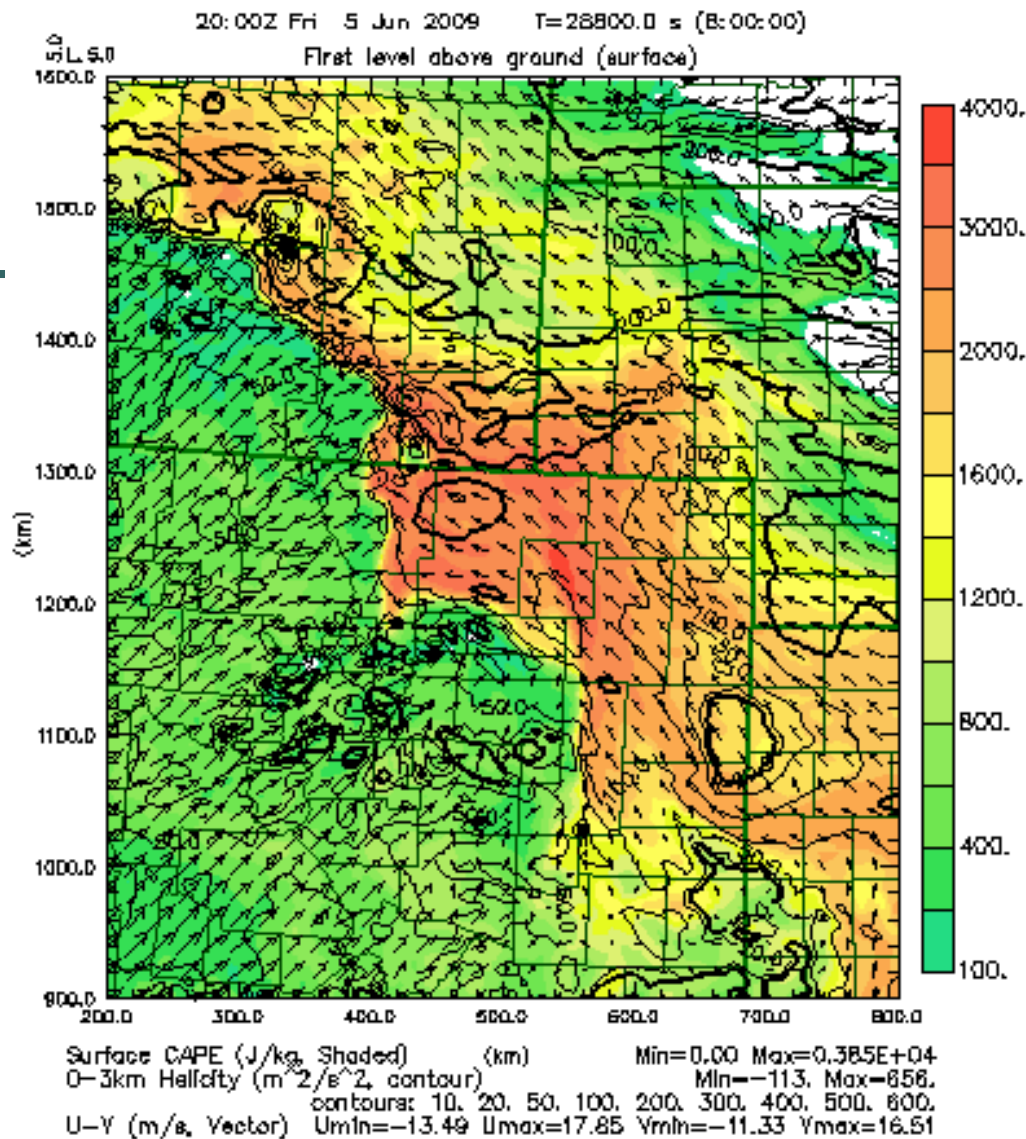


Spring 2010 Real-time Forecast Plan

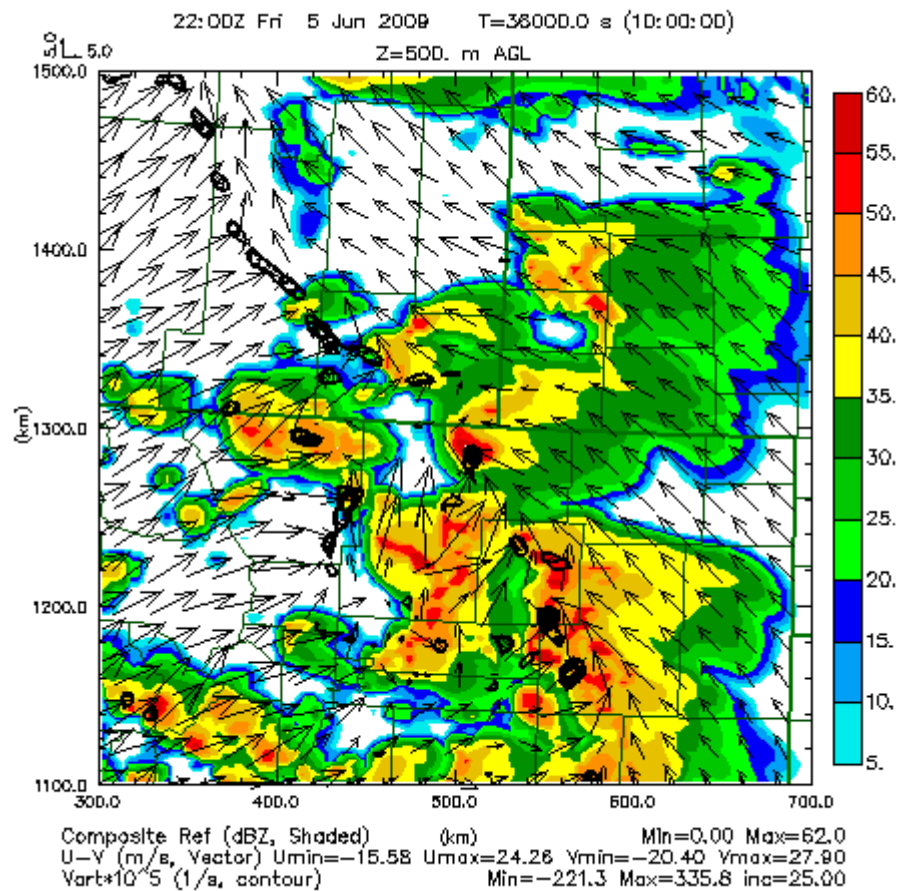
- 00 UTC 20-Member 30h Forecast Ensemble
 - Full CONUS
 - 10 WRF ARW, 8 WRF NMM, 2 ARPS 4-km
- 00 UTC WRF ARW 1-km with Radar
- 12 UTC 4-km WRF Vortex-2 Domain
 - With & Without Radar (cold start)
- 15-18 UTC Custom LEAD-in-a-Box
 - Targeted Domain 1000x1000 km
- CASA Forecasts – More Frequent, Shorter



June 5, 2009

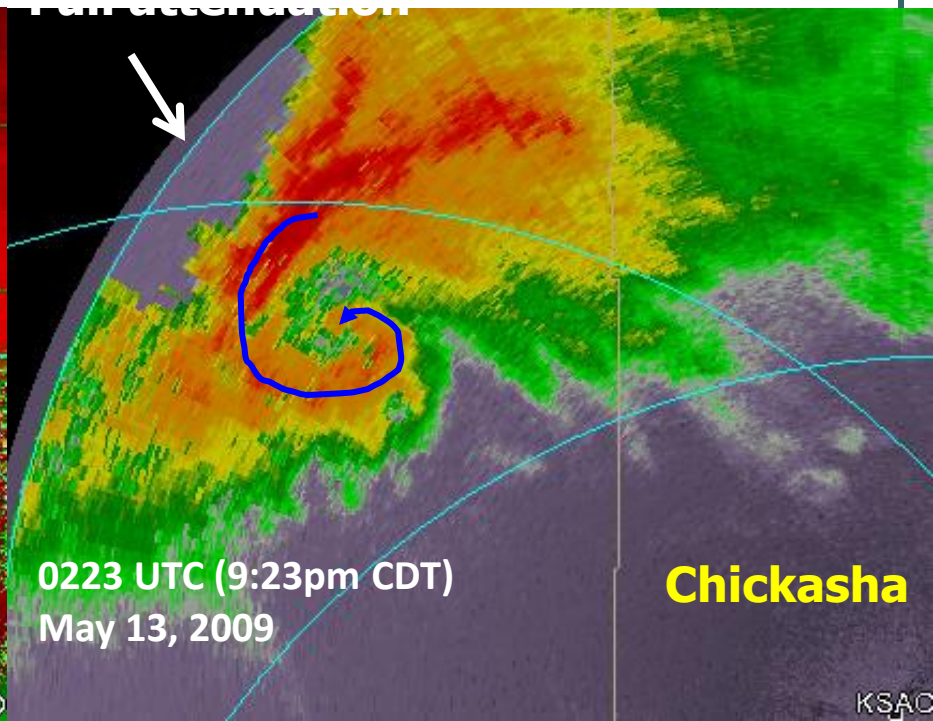
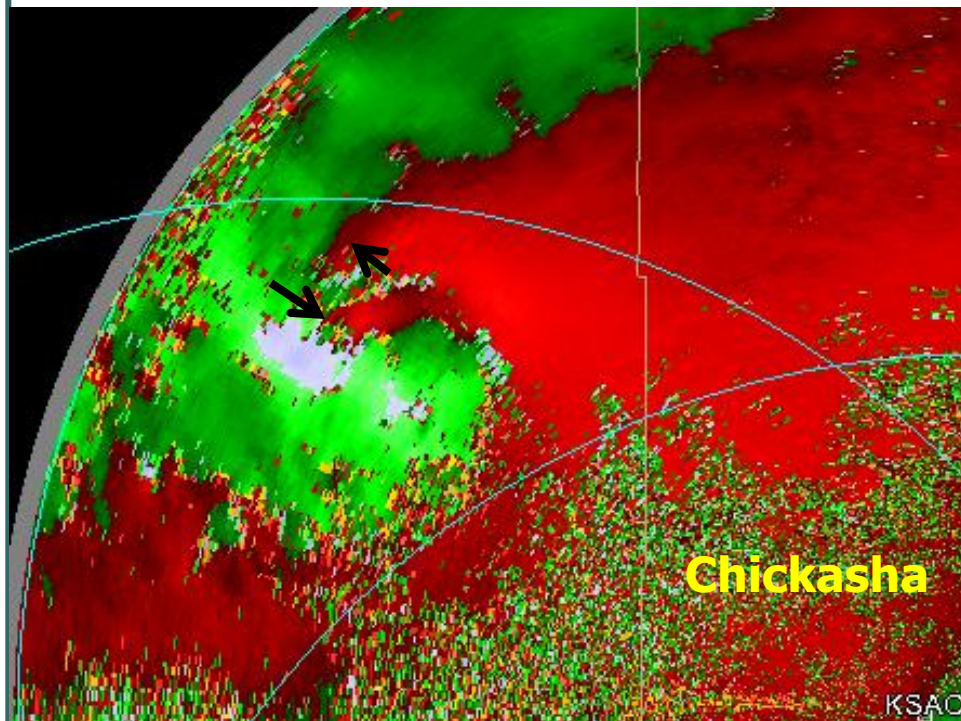


June 5, 2009

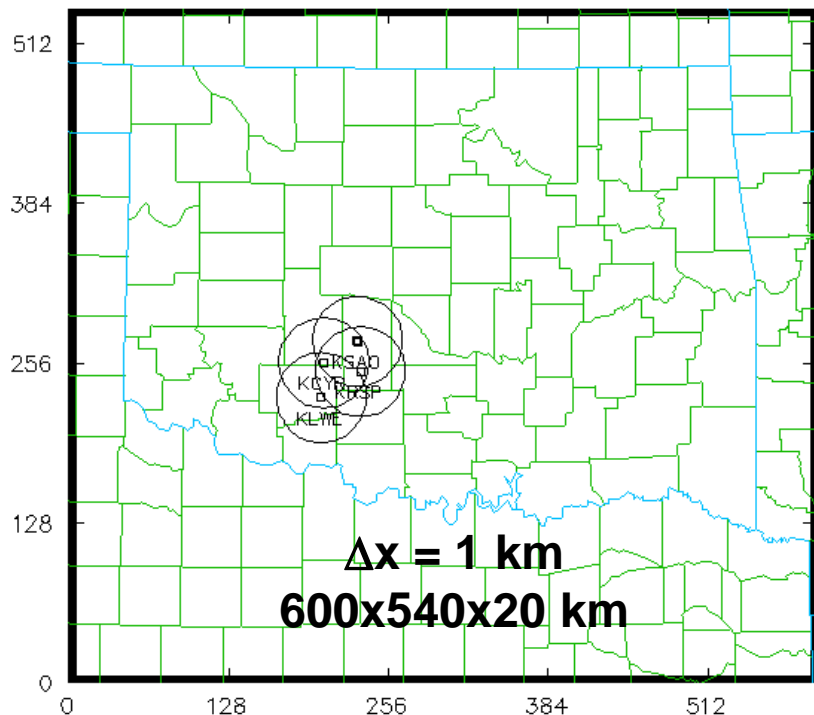


May 13/14 2009 Anadarko Tornado Case

CASA - VORTEX2



2009 CASA Assim Configuration



T0-0.5h t0

t0+6h

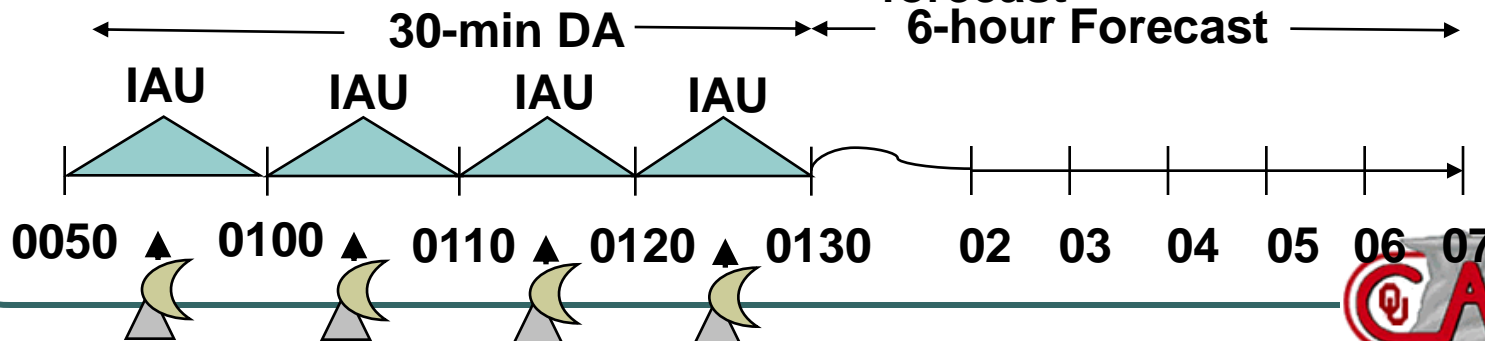
Using CASA, WSR-88D, OK Mesonet, data & operational NWP background

Using ARPS 3DVAR and the cloud analysis.

Incremental Analysis Updating applied to smoothly insert data and allow model adjustment

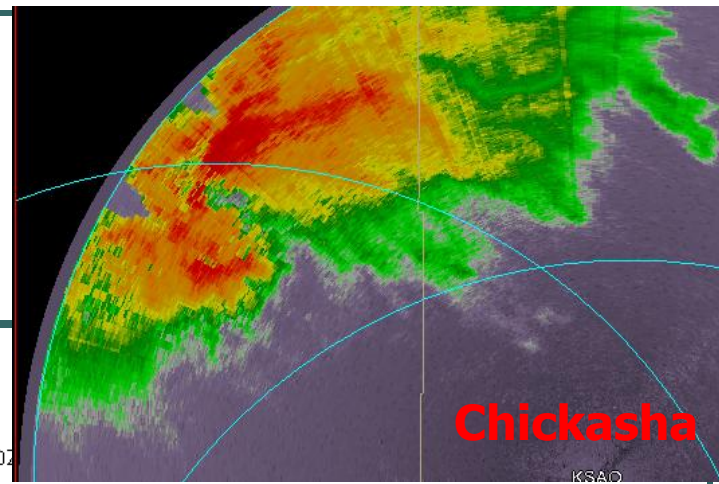
1.5 hours to complete each 6-h forecast

6-hour Forecast

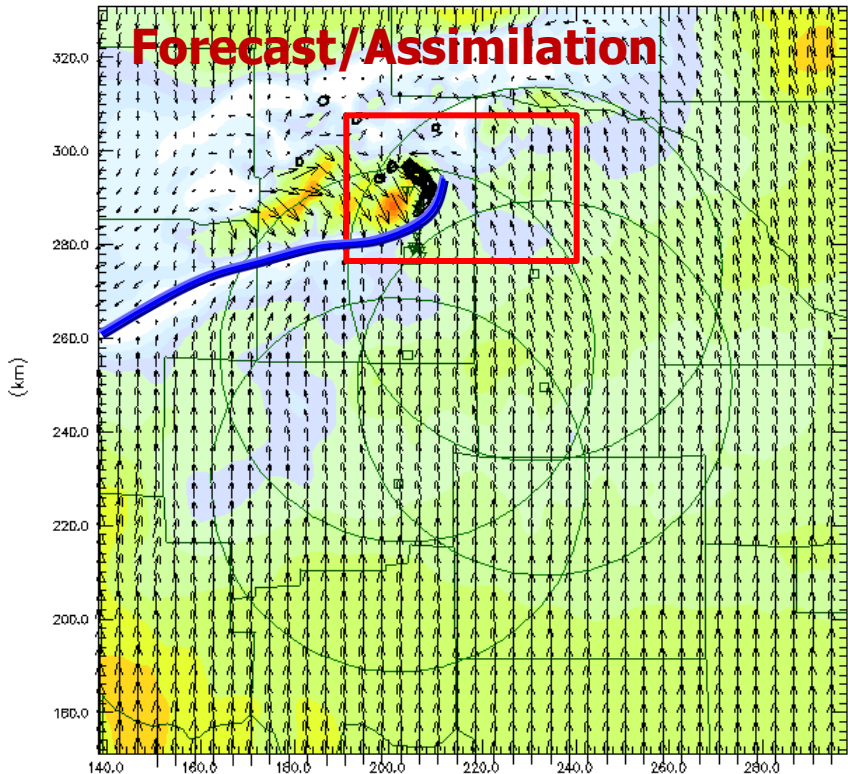


Assim. v.s. Analysis

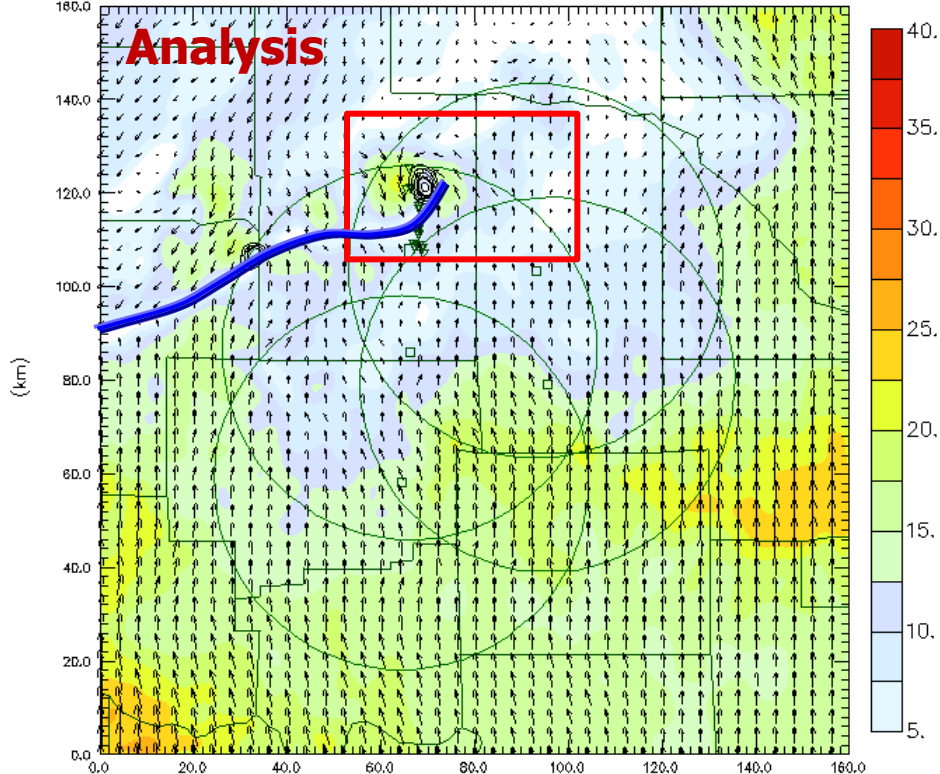
Wind Speed/Vectors at 500m AGL at **0220 UTC**



02:20Z Thu 14 May 2009 T=1800.0 s (0:30:00)
Z=500. m AGL



02:20Z Thu 14 May 2009 T=1800.0 s (0:30:00)
Z=500. m AGL

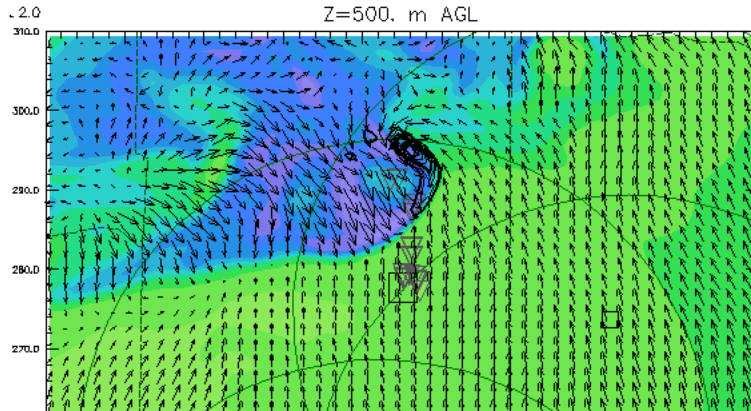


Horiz. wind (m/s, Shaded) (km) Min=0.860 Max=30.
U-V (m/s, Vector) Umin=-23.61 Umax=25.75 Vmin=-27.42 Vmax=23.9
Vort*10⁻⁵ (1/s, contour) Min=-724.6 Max=2622. inc=100.

Horiz. wind (m/s, Shaded) (km) Min=0.417 Max=26.0
U-V (m/s, Vector) Umin=-13.27 Umax=9.61 Vmin=-20.41 Vmax=25.73
Vort*10⁻⁵ (1/s, contour) Min=-474.6 Max=934.6 inc=100.0

Forecast temperature perturbation + Vort. at z = 500m AGL

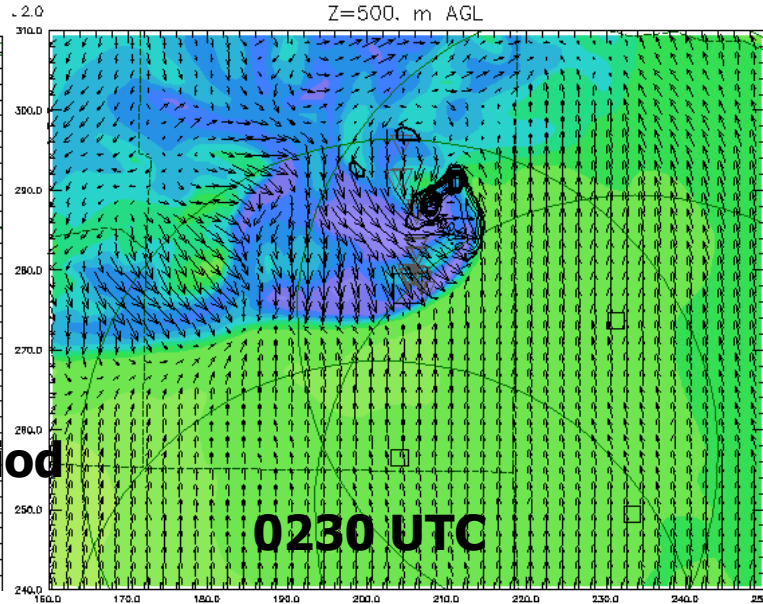
02:20Z Thu 14 May 2009 T=1800.0 s (0:30:00)
Z=500. m AGL



End of Data Assimilation Period

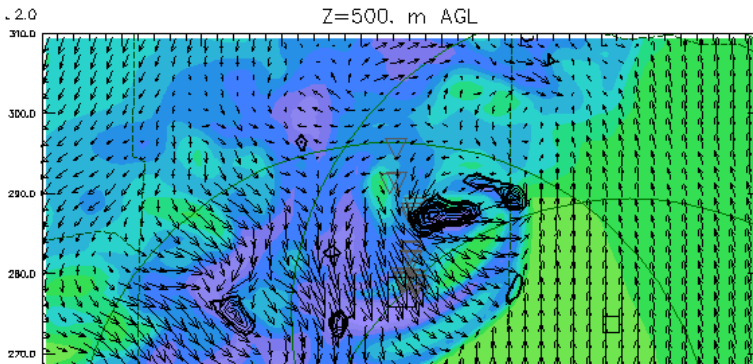
0220 UTC

02:30Z Thu 14 May 2009 T=2400.0 s (0:40:00)
Z=500. m AGL



0230 UTC

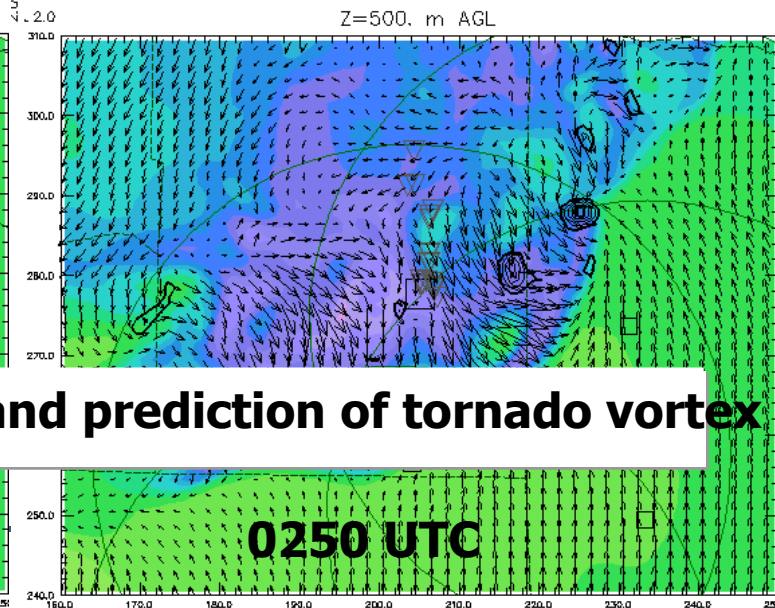
02:40Z Thu 14 May 2009 T=3000.0 s (0:50:00)
Z=500. m AGL



1st ever radar-initialized and prediction of tornado vortex

0240 UTC

02:50Z Thu 14 May 2009 T=3600.0 s (1:00:00)
Z=500. m AGL



0250 UTC

Movie



CAPS Needs

- Data for High Resolution Research Assimilations (e.g., IAU, EnKF)
 - Mobile Mesonet/Sticknet
 - Mobile radar data
 - Tornado and Null Supercell cases
- Data for Verification
 - Surface cold pool
 - Microphysics
- PI Requirements for 2010 VORTEX2 Real-time

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